REMARKS

The issues outstanding in the Final Rejection are apparently solely the rejection under 35 U.S.C. §102 and §103, as the Advisory Action of May 19, 2003 does not appear to address the rejections under 35 U.S.C. §112. Therefore, the §112 rejections are being treated as withdrawn.

Rejection Under 35 U.S.C. §102:

In the first Office Action in this application, claims 1, 6-11, 14-16 were rejected under 35 U.S.C. §102(b) over Laing '356. Moreover, claims 5 and 10-13 were rejected under 35 U.S.C. §103 over Laing in combination with various other references. The Final Rejection mailed December 31, 2002, indicates that claims "1-16" are rejected, but does not indicate that the rejections have been changed in any way over the original Office Action. However, the Advisory Action of May 19, 2003, solely indicates that claims 1 and 5-16 have been rejected. Thus, the status of claims 2-4 is unclear, and clarification of the rejection is requested in the next Office Action. In the present reply, the claims will be treated as initially rejected in the first Office Action in this application.

It is respectfully maintained that Laing fails to anticipate the present claims. As will be recalled, Laing discloses a cooling device for a semiconductor apparatus comprising a chamber enclosing a non-metallic crystal forming material which can undergo a phase change at a temperature which corresponds to the desired operating temperature of the semiconductor component. More specifically, the semiconductor component that is in heat conductive communication is substantially

thermally insulated (col. 2, lines 58-62). The operational nature of the Laing cooling device requires that there is a prerequisite temperature (optimum operating temperature of the semiconductor) which must be met before the crystal forming material will actually undergo the phase change and result in cooling (col. 2, lines 62-67). Moreover, the

layers of the crystal forming material which are directly adjacent to the semiconductor will undergo a phase change and melt while those layers which are further removed from the semiconductor will remain substantially at room temperature (col. 2, line 67 - col.3, line 5). Thus, the intent of the Laing device is to rapidly heat to the operating temperature, then to dissipate the generated heat. The semiconductor component of the Laing device is in fact considered substantially thermally insulated (col.2, lines 60-61). The device of Laing is clearly of the conventional sort of heat sink design where the phase change material first has to heat before the heat can be dissipated via the cooling fins. There can be no loss of heat from the system until the semiconductor reaches the critical optimum temperature, as is desirable where fast heat up to operating temperature is needed. This sort of design, by nature, would not be suitable for dissipating irregular heat output peaks, i.e. non-uniform outputs. It is acknowledged that the Advisory Action argues that a device which has a non-uniform output profile/irregular heat output peaks is not specified in the claims. In fact, Applicants respectfully disagree. Note, claim 1, line 2; moreover, note claim 9, line 2 as well as the recitation in method claims 17-19.

Applicant's invention is related to phase change materials for use in cooling electrical and electronic components arranged such the flow of heat is preferentially not to the phase change

material but to the heat absorbing component (e.g., a heat sink). Significant flow to the PCM occurs when heat sink temperature exceeds the phase change temperature of the phase change material. The term 'preferential' would be readily understood by one of ordinary skill in the art and in view of the disclosure in the specification at page 5, lines 13-20. The invention relates to a cooling device which has a non-uniform output profile. The heat is dissipated by the heat absorbing means, for example, cooling fins as a heat sink, and the majority of the heat does not become absorbed by the phase change material unless there is a build up of heat that the heat absorbing unit cannot dissipate. The specification discusses conventional heat sinks, such as the one disclosed by Laing, at page 5, lines 3-8. A shortcoming of conventional heat sinks is that the heat flow from the semiconductor to the heat sink is interrupted if the PCM first has to absorb the heat before the heat can be dissipated by the cooling fins. The specification teaches that conventional sinks could be improved if the heat flow was not interrupted. Further, the conventionally designed heat sinks are not suitable for absorbing the peak output of components having an irregular output profile since they do not ensure optimized discharge of the PCM (see the specification at page 4, line 17). Applicants' invention is directed to the very fault observed in other heat sink designs, including Laing. Applicants found that it was advantageous to arrange the phase change materials in or on the heat sink in such a way that significant heat flow occurs only if the heat sink temperature exceeds the phase change temperature of the PCM. In the applicants' device, the PCM (4) is arranged in or on the heat sink (1) in such a way that heat flow from the CPU(2) on the support(3) preferentially is to the dissipating means, and significantly to the PCM only if the heat sink exceeds the phase temperature of the PCM. Thus, the

PCM only absorbs the output peaks (see the specification at page 6, lines 15-19 and Figure 2) and is not the primary absorption portion of the device. This arrangement allows for the absorption of heat only when the heat conducting unit cannot sufficiently dissipate the heat via the cooling fins. Claims 14-16 clearly recite that the device comprises a heat sink and a heat absorbing component containing a phase change material and that the heat flows from the heat sink to the heat absorbing component when the heat sink temperature exceeds the phase change temperature of the phase change material. Claims 20-21 recite that heat flow is *directly* to the heat sink, rather than the PCM - clearly not disclosed, much less taught, by Laing in which the PCM blocks the heat sink. This arrangement allows for enhancement of the cooling capacity of the cooling fins which yields a jump in the efficiency of the heat sink (Examples 2 and 3). Applicants' invention allows for cooling of electrical and electronic components and absorbing the output temperature peaks (specification at page 4, lines 18-19). Thus, the instant invention utilizes conventional heat dissipation in combination with cooling provided by the PCMs as opposed to the cooling provided only by the PCM in the Laing device.

In view of the nature of the workings of the Laing device, there would clearly be no motivation to modify the arrangement in the device in order to arrive at the applicants' claimed invention. The Laing device requires that the PCM is placed next to the semiconductor such that the semiconductor can heat up quickly and the heat produced by the semiconductor is absorbed by the phase change material. Altering this arrangement, so that heat is dissipated by the cooling fins with the possibility that insufficient heat is generated to cause a phase change in the PCM, totally

undercuts the intent of the patent. One of skill in the art would have no motivation to modify the disclosure to arrive at applicants' invention. Further, any deficiency in Laing is not cured by any of the other prior art references.

Moreover, Laing in no way suggests a method wherein a heat generating component is contacted with a heat sink and heat absorbing component such that heat flows from the heat sink to the heat absorbing component when the heat sink temperature exceeds the phase change temperature of the phase change material. Instead, as discussed above, the orientation in Laing is the reverse.

Finally, it is submitted that Laing fails to suggest phase change materials which are liquid/gaseous heat transfer media such as halogenated hydrocarbons, nor does the patent suggest a solid-solid phase change material (see present claims 3-5). Perhaps, this is the reason that these claims were omitted from the recitation of rejected claims in the Advisory Action.

In any event, withdrawal of the rejections under 35 U.S.C. §102 and 103 is respectfully requested. The claims in the application are submitted to be in condition for allowance. However, should the Examiner have any questions or comments, he or she is cordially invited to telephone the undersigned at the number below.

The Commissioner is hereby authorized to charge any fees associated with this response or credit any overpayment to Deposit Account No. 13-3402.

Respectfully submitted,

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